

WHAT IS CLAIMED IS:

- 1           1.       A method for maintaining a link between a first network entity and a  
2       second network entity, wherein the first network entity includes a network adapter and a  
3       driver, comprising:  
4           determining, with the network adapter, whether the driver was loaded before a  
5       link-shutdown timer expired, wherein the link-shutdown timer is associated with the link;  
6           continuing processing without dropping the link, with the network adapter, in  
7       response to the driver being loaded before the link-shutdown timer expired; and  
8           dropping the link, with the network adapter, in response to the driver not being  
9       loaded before the link-shutdown timer expired.
- 1           2.       The method of claim 1, further performing:  
2           determining, with the network adapter, whether a register has a value indicating  
3       that the driver has been loaded.
- 1           3.       The method of claim 1, further performing:  
2           determining, with the network adapter, whether the link-shutdown timer has  
3       expired; and  
4           periodically determining, with the network adapter, whether the driver was loaded  
5       in response to determining that the link-shutdown timer has not expired.
- 1           4.       The method of claim 1, further performing:  
2           determining, with the network adapter, whether the link-shutdown timer has  
3       expired; and  
4           periodically determining, with the network adapter, whether the driver was loaded  
5       in response to the driver not being loaded and the link-shutdown timer not having  
6       expired.

1           5.       A method implemented in a driver executing in a first network entity for  
2 maintaining a link between the first network entity and a second network entity, wherein  
3 the driver performs:

4           starting a link-shutdown timer for dropping a link;  
5           upon being reloaded, determining whether the link is available; and  
6           continuing processing without renegotiating the link in response to the link being  
7 available.

1           6.       The method of claim 5, wherein the driver further performs:  
2 renegotiating the link in response to the link being available.

1           7.       The method of claim 5, wherein the driver further performs:  
2 determining, whether flow control is enabled; and  
3 sending an indicator to the second network entity to indicate that the second  
4 network entity is to stop sending data packets to the first network entity in response to  
5 flow control being enabled.

1           8.       The method of claim 7, wherein after the driver is reloaded, the driver  
2 further performs:  
3 determining whether flow control is enabled; and  
4 sending an indicator to the second network entity to indicate that the second  
5 network entity is to start sending data packets to the first network entity in response to  
6 flow control being enabled.

1           9.       The method of claim 5, further performing:  
2 when the driver is reloaded, disabling the link-shutdown timer in response to the  
3 link-shutdown timer being enabled and not being expired.

1           10.     A system coupled to a network and data storage, comprising:  
2           a storage controller managing Input/Output (I/O) access to the data storage;  
3           at least one driver;  
4           a network adapter; and  
5           control logic to cause the network adapter to perform operations, the operations  
6 comprising:  
7                 (i)     determining, with the network adapter, whether the driver was  
8           loaded before a link-shutdown timer expired;  
9                 (ii)    continuing processing without dropping a link for which the link-  
10          shutdown timer was started in response to the driver being loaded before the link-  
11          shutdown timer expired; and  
12                 (iii)   dropping the link in response to the driver not being loaded before  
13          the link-shutdown timer expired.

1           11.     The network adapter of claim 10, wherein the operations caused by the  
2          control logic further comprise:  
3           determining whether a register has a value indicating that the driver has been  
4          loaded.

1           12.     The network adapter of claim 10, wherein the operations caused by the  
2          control logic further comprise:  
3           determining whether the link-shutdown timer has expired; and  
4           periodically determining whether the driver was loaded before the link-shutdown  
5          timer expired in response to determining that the link-shutdown timer has not expired.

1           13.    The network adapter of claim 10, wherein the operations caused by the  
2   control logic further comprise:  
3           determining whether the link-shutdown timer has expired; and  
4           periodically determining whether the driver was loaded in response to the driver  
5   not being loaded and the link-shutdown timer not having expired.

1           14.    A system coupled to a network and data storage, comprising:  
2   a processor;  
3   a storage controller managing Input/Output (I/O) access to the data storage; and  
4   a driver, executed by the processor, to perform operations, the operations  
5   comprising:  
6           (i)     starting a link-shutdown timer for dropping a link;  
7           (ii)    upon being reloaded, determining whether the link is available;  
8   and  
9           (iii)   continuing processing without renegotiating the link in response to  
10   the link being available.

1           15.    The system of claim 14, wherein the operations further comprise:  
2   renegotiating the link in response to the link not being available.

1           16.    The system of claim 14, wherein the operations further comprise:  
2   determining whether flow control is enabled; and  
3   sending an indicator to the second network entity to indicate that the second  
4   network entity is to stop sending data packets to the first network entity in response to  
5   flow control being enabled.

1           17.    The system of claim 16, wherein after the driver is loaded, the operations  
2 further comprise:  
3           determining whether flow control is enabled; and  
4           sending an indicator to the second network entity to indicate that the second  
5 network entity is to start sending data packets to the first network entity in response to  
6 flow control being enabled.

1           18.    The system of claim 14, wherein the operations further comprise:  
2           when the driver is reloaded, disabling the link-shutdown timer in response to the  
3 link-shutdown timer being enabled and not being expired.

1           19.    An article of manufacture for maintaining a link between a first computer  
2 and a network entity, wherein the first computer includes a network adapter and a driver,  
3 and wherein the article of manufacture causes operations to be performed in the network  
4 adapter, the operations comprising:  
5           (i)     determining, with the network adapter, whether the driver was  
6 loaded before a link-shutdown timer expired, wherein the link-shutdown timer is  
7 associated with the link;  
8           (ii)    continuing processing without dropping the link in response to the  
9 driver being loaded before the link-shutdown timer expired; and  
10          (iii)   dropping the link in response to the driver not being loaded before  
11 the link-shutdown timer expired.

1           20.    The article of manufacture of claim 19, wherein the operations further  
2 comprise:  
3           determining whether a register has a value indicating that the driver has been  
4 loaded.

1           21.     The article of manufacture of claim 19, wherein the operations further  
2 comprise:  
3           determining whether the link-shutdown timer has expired; and  
4           periodically determining whether the driver was loaded before the link-shutdown  
5 timer expired in response to determining that the link-shutdown timer has not expired.

1           22.     The article of manufacture of claim 19, wherein the operations further  
2 comprise:  
3           determining whether the link-shutdown timer has expired; and  
4           periodically determining whether the driver was loaded in response to the driver  
5 not being loaded and the link-shutdown timer not having expired.

1           23.     An article of manufacture for maintaining a link between a first computer  
2 and a network entity, wherein the first computer includes a driver, and wherein the article  
3 of manufacture causes operations to be performed in the driver, the operations  
4 comprising:  
5           starting a link-shutdown timer for dropping a link;  
6           upon being reloaded, determining whether the link is available; and  
7           continuing processing without renegotiating the link in response to the link being  
8 available.

1           24.     The article of manufacture of claim 23, wherein the operations further  
2 comprise:  
3           renegotiation the link in response to the link not being available.

1           25.    The article of manufacture of claim 23, wherein the operations further  
2 comprise:

3           determining, whether flow control is enabled; and  
4           sending an indicator to the second network entity to indicate that the second  
5 network entity is to stop sending data packets to the first network entity in response to  
6 flow control being enabled.

1           26.    The article of manufacture of claim 25, wherein after the driver is loaded,  
2 the operations further comprise:

3           determining whether flow control is enabled; and  
4           sending an indicator to the second network entity to indicate that the second  
5 network entity is to start sending data packets to the first network entity in response to  
6 flow control being enabled.

1           27.    The article of manufacture of claim 23, wherein the operations further  
2 comprise:

3           when the driver is reloaded, disabling the link-shutdown timer in response to the  
4 link-shutdown timer being enabled and not having expired.